

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : NIPPON SHOKUBAI CO LTD

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(72)Inventor : TAKEDA MITSUO  
UEDA YUMIKO**(54) SURFACE MODIFIED INORGANIC MINUTE PARTICLE AND ITS USAGE AND METHOD OF MODIFYING SURFACE OF INORGANIC MINUTE PARTICLE****(57)Abstract:**

**PROBLEM TO BE SOLVED:** To provide a surface modified inorganic minute particle excellent in dispersion stability, and not liable to gel over time, and its usage, and a method of modifying surface of an inorganic minute particle.

**SOLUTION:** This inorganic particle is a minute particle treated with the following two compounds (A) and (B). Compound (A): alkoxide of a metal and/or its partially hydrolyzed (condensed) compound. Compound (B): an organic silica compound shown by general formula (1) and/or its partially hydrolyzed (condensed) compound.  $Y_mSiX_n$  (1) wherein Y is an organic functional group, X is a hydrolyzed group, m and n are each an integer of 1-3, and they satisfy  $n+m=4$ .

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## CLAIMS

[Claim(s)]

[Claim 1] Inorganic system particles which come to carry out a surface treatment with the two following sorts of compounds (A) and (B).  
A compound (A): Metaled alkoxides and/or a hydrolysis (condensation) thing of those (portion).  
A compound (B): An organic silicon compound shown with a following general formula (1), and/or its (portion) hydrolysis (condensation) thing.  
$$Y_m SiX_n (1)$$
  
(However, as for Y, a hydrolytic basis, and m and n are the integers of 1-3, respectively, and an organic functional group and X satisfy  $m+n=4$ .)  
[Claim 2] Y in said general formula (1) An alkyl group, a cycloalkyl group, an aryl group. They are at least one sort chosen from an aralkyl group and an acyl group of bases which may be replaced, X --- a halogen atom and OR group (however, R --- a hydrogen atom, an alkyl group, and a cycloalkyl group.) They are at least one sort chosen from an aryl group, an aralkyl group, and an acyl group of bases which may be replaced. And the inorganic system particles according to claim 1 which are at least one sort chosen from a  $NH_2$  group of bases which may be replaced.  
[Claim 3] An inorganic system particle containing composition in which the whole contains the inorganic system particle according to claim 1 or 2 0.01 to 95% of the weight.  
[Claim 4] The inorganic system particle containing composition according to claim 3 whose rate of inorganic system particles and inorganic system particles to the total quantity of a solvent it is an inorganic system particle dispersing element containing a solvent, and is 10 to 70 % of the weight.  
[Claim 5] The inorganic system particle containing composition according to claim 3 whose rate of inorganic system particles and inorganic system particles to the total quantity of organic resin it is a constituent for shaping containing organic resin, and is 0.01 to 95 % of the weight.  
[Claim 6] The inorganic system particle containing composition according to claim 3 whose content of inorganic system particles and a binder component it is a constituent for coats containing a binder component and a solvent, and is 10 to 70% of the weight of the whole constituent.  
[Claim 7] Mold goods which are resin-molding articles which use inorganic system particles as a filler, and are characterized by what the inorganic system particles according to claim 1 or 2 are included for 0.01 to 95% of the weight to the total quantity of inorganic particles and organic resin as said inorganic system particle.  
[Claim 8] Are a coat which uses inorganic system particles as a filler the paint article which it had, and said coat, A paint article characterized by content of inorganic system particles and a binder component being the coat obtained from a constituent for coats which is 10 to 70% of the weight of the whole constituent including inorganic system particles according to claim 1 or 2, a binder component, and a solvent.  
[Claim 9] A surface modification method of inorganic system particles which contact inorganic system particles to the two following sorts of compounds (A) and (B).  
A compound (A): Metaled alkoxides and/or a hydrolysis (condensation) thing of those (portion).  
A compound (B): An organic silicon compound shown with a following general formula (1), and/or its (portion) hydrolysis (condensation) thing.  
$$Y_m SiX_n (1)$$
  
(However, as for Y, a hydrolytic basis, and m and n are the integers of 1-3, respectively, and an

organic functional group and X satisfy  $m+n=4$ .)

[Translation done.]

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]  
[Field of the Invention] This invention does not have deterioration, is excellent in dispersion stability, and relates to the surface modification method of the inorganic system particles by which the catalytic activity which inorganic system particles originally have (light) was controlled, and the use and inorganic system particles.

[0002]  
[Description of the Prior Art] As a method of reforming the surface of inorganic system particles, the method of carrying out a surface treatment by various coupling agents, such as a silane coupling agent, a titanate system coupling agent, and an aluminate system coupling agent, is known. In the constituent for shaping in which the particles by which the surface treatment was carried out by these coupling agents contain particles, for example, it is known that the adhesion of particles and organic resin and the dispersibility of particles will be improved. Among these, since the Silang system compound which has various kinds of organic chains is developed, the silane coupling agent can introduce the good organic chain of compatibility to said organic resin into the surface of inorganic system particles by choosing the kind of said organic chain according to the kind of organic resin.

[0003] However, in order to process the surface of inorganic system particles efficiently by a silane coupling agent. Since the catalyst and moisture of acetic acid, chloride, etc. were needed, in an oxide with the low chemical resistance of a zinc oxide etc., it was difficult to carry out a surface treatment efficiently, and also there was a problem said that secondary condensation of particles occurs easily by the drying process after the time of a surface treatment or processing, etc. The problem of the above-mentioned secondary condensation by it being 0.1 micrometer or less especially in particle diameter as inorganic system particles are detailed appears notably. And although it thinks because the area of each crystal face of each particle is small, it is also difficult to introduce a coupling agent into a particle surface by high coverage.

[0004] In that respect, metal alkoxides are polyfunctional, and since the labile of an alkoxy group is high, it is easy to combine it with the surface of inorganic system particles at high concentration. However, the solvent dispersing element and the constituent for membrane formation containing the inorganic system particles by which the surface treatment was carried out by metal alkoxides have problems, such as causing gelling temporally.

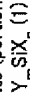
[0005]  
[Problem(s) to be Solved by the Invention] Then, there is the issue which this invention tends to solve in providing the surface modification method of the inorganic system particles which should be [ that temporal gelling cannot get up easily and temporal gelling cannot get up the inorganic system particles excellent in dispersion stability, and the use and inorganic system particles easily ] excellent in dispersion stability.

[0006]  
[Means for Solving the Problem] In order to solve an aforementioned problem, as a result of examining a kind of finishing agent wholeheartedly, by using together metal alkoxides and an organic silicon compound which has a hydrolytic basis, this invention person found out that an aforementioned problem was solved, and completed this invention. Therefore, it comes to carry out the surface treatment of the inorganic system particles concerning this invention with the two following sorts of

compounds (A) and (B).

Compound (A): Metal alkoxides and/or a hydrolysis (condensation) thing of those (portion).

[0007] Compound (B): An organic silicon compound shown with a following general formula (1), and/or its (portion) hydrolysis (condensation) thing



(However, as for Y, a hydrolytic basis, and m and n are the integers of 1-3, respectively, and an organic functional group and X satisfy m+n=4.)

inorganic system particles to which refining of the inorganic system particle containing composition concerning this invention was carried out by the above-mentioned surface treatment -- whole 0.01- it contains 95% of the weight. This inorganic system particle containing composition can be an inorganic system particle dispersing element containing a solvent, and a rate of inorganic system particles and inorganic system particles to the total quantity of a solvent can be 10 to 70 % of the weight.

[0008] This inorganic system particle containing composition can be a constituent for shaping containing organic resin, and a rate of inorganic system particles and inorganic system particles to the total quantity of organic resin can be 0.01 to 95 % of the weight. This inorganic system particle containing composition can be a constituent for coats containing a binder component and a solvent, and content of inorganic system particles and a binder component can be 10 to 70% of the weight of the whole constituent. The following is a use of inorganic system particles by which refining was carried out [ above-mentioned ]. That is, a resin-molding article concerning this invention contains inorganic system particles by which refining was carried out [ above-mentioned ] as inorganic system particles 0.01 to 95% of the weight to the total quantity of inorganic particles and organic resin.

[0009] A paint article concerning this invention is the coat obtained from a constituent for coats whose content of inorganic system particles and a binder component is 10 to 70% of the weight of the whole constituent including inorganic system particles, a binder component, and a solvent in which refining of the coat was carried out [ above-mentioned ]. And it is made for a reforming method of inorganic system particles concerning this invention to contact inorganic system particles to the two above-mentioned sorts of compounds (A) and (B).

[0010]

[Embodiment of the Invention] - Inorganic system particles, a surface modification method by which surface treatment was carried out - [Inorganic system particles] As inorganic system particles used by this invention, metal chalcogen ghosts, such as metal and metallic sulfide, a metal (water) oxide, metal carbide, a nitride, an oxynitride, etc. can be mentioned. Also among these, a metal (water) oxide is preferred, thermal stability and chemical stability are high, and it is easy to receive industrially. As the above-mentioned metal (water) oxide,  $TiO_2$ ,  $ZnO$ ,  $CeO_2$ . Ultraviolet-rays cover nature metal (water) oxide and  $Sn(IV)$ , such as  $Fe_2O_3$ . Tin series (water) oxide,  $Cd_3SnO_2$ , such as In system (water) oxide,  $Sb(V)$  content tin oxide, such as content indium oxide (ITO). Antimony system (water) oxide,  $FeO(s)$ , such as zinc system (water) oxides, such as In content zinc oxide, and zinc antimonate. Heat ray cover nature metal (water) oxides, such as conductive (water) oxides, such as  $Fe_3O_4$ ,  $VO_2$ ,  $V_2O_5$ ,  $WO_3$ ,  $ReO_3$ ,  $IrO_2$ , and  $RuO_2$ , etc. can be mentioned. Since the film formation material of the outstanding transparency, etc. are obtained industrially, these metal (water) oxides are preferred. Since a visible light transmittance state is high, and can cover a heat ray selectively and In system (water) oxide, a tin series (water) oxide, a zinc system (water) oxide, an antimony system (water) oxide, etc. are easy to come to hand industrially, it is especially desirable.

[0011] Various inorganic system particles used by this invention may be inorganic system particles which have the developed functionality, for example, can mention the particles mentioned to following \*\* - \*\*.

\*\* The inorganic system particles which have light transmission and cover regulation functions, such as luminescence functions, such as optical discriminative trip functions, such as an ultraviolet absorption function, heat ray absorption, or a reflex function, a fluorescence function, and a phosphorescence function, and an electrochromic function.

\*\* The inorganic system particles which have electrical functions, such as an antistatic function, an electric conduction function, and an electromagnetic shielding function.

[0012]\*\* The inorganic system particles which have a photocatalyst function.

※ The inorganic system particles which have magnetic functions, such as a ferromagnetic. As for the inorganic system particles used by this invention, it is preferred that it is crystallinity in X diffraction study, and their functionality is high in this case. From a viewpoint of transparency, the particle diameter of the inorganic system particles used by this invention is 0.1 micrometer or less preferably, and is 0.03 micrometer or less most preferably 0.05 micrometer or less still more preferably. Although particle diameter is prescribed by various definitions, in this invention, the distributed particle diameter Dd can be mentioned, for example. The distributed particle diameter Dd is the mean particle diameter of the number standard measured by dynamic light scattering. Therefore, the distributed particle diameter Dd of the inorganic system particles used by this invention is 0.1 micrometer or less preferably, and in order to obtain the high constituent of transparency, it is 0.03 micrometer or less especially preferably 0.05 micrometer or less still more preferably. As primary particle diameter, the crystallite diameter Dw for which it asked with the Wilson's method can also be mentioned, for example about 3 line of the diffraction peaks obtained by the crystallite size measurement by an X-ray diffraction method. Therefore, 0.05 micrometer or less of crystallite diameters [0.03 micrometer or less of ] Dw of the inorganic system particles used by this invention are 0.020 micrometer or less especially preferably still more preferably preferably at the point of excellent in transparency.

[A finishing agent slack compound (A), (B)] Two sorts of compounds (A) and (B) used by this invention act as a modifier for raising the dispersibility of inorganic system particles. In this invention, the compound (A) and (B) can be used together with other dispersing agents for the further improvement in dispersibility.

[0013]The compounds (A) used by this invention are metaled alkoxides or a hydrolysis (portion) (condensation) thing of these alkoxides. As metaled alkoxides, the compound shown with a following general formula (2) can be mentioned.



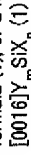
(However, they are at least one sort as which a metallic element is chosen as as for M, and the valence of M and R are chosen from a hydrogen atom, an alkyl group, a cycloalkyl group, an aryl group, an aralkyl group, and an acyl group as for q of bases which may be replaced.)

It is a point in which a compound (B) tends to carry out a chemical bond to the particles processed with the compound (A) as M in a general formula (2). The valence of the metallic element more than divalent is preferred, and especially reactivity with inorganic system particles is high in a metallic element being at least one sort chosen from aluminum, Ti, and Zr, and since it is easy to deal with these alkoxides and moreover easy to receive industrially, it is still more desirable.

[0014]In a general formula (2), as R, an alkyl group is easy to come to hand industrially, and the alkyl group of the carbon numbers 1-20 is preferred. A replaced alkyl group like an ethoxyethoxyethyl group is also contained in R. As a compound (A), for example Aluminum trimethoxide, aluminum tri-sec-butoxide, aluminum tri-tert-butoxide, A mono-sec-butoxyaluminum JISOPUROPI rate, aluminum TORIETOKISHI ethoxyethoxide, Aluminum alkoxides, such as aluminum phenoxide, Titanium n-butoxide, Titanium tetra-tert-butoxide, titanium tetra-sec-butoxide, Titanium tetraethoxide, titanium tetra isopropoxide, Titanium tetra 2-ethyl HEKISOKISHIDO, titanium tetraisobutoxide, Titanium lactate, a titanium tetramethoxide, titanium tetra (methoxy propoxide), Titanium tetra (methylphenoxide) and titanium tetra n-nonyloxide, Titanium alkoxides, such as titanium tetra n-butoxide, titanium tetra steer BIROKISHIDO, and titanium bis(triethanolamine)-diisopropoxide; Zirconium tetra n-butoxide, Zirconium tetra-tert-butoxide, zirconium tetra 2-ethyl HEKISOKISHIDO, Zirconium alkoxides, such as zirconium tetraisobutoxide, zirconium tetraethoxide, zirconium tetra isopropoxide, zirconium tetra n-propoxide, and zirconium tetra (2-methyl-2-butoxide), etc. are illustrated.

[0015]The hydrolysis (portion) (condensation) thing which is a derivative of the above-mentioned metal alkoxide is also contained in a compound (A). For example, lines (the thing containing branched chain is included) including the linear and annular trimer in which a metal alkoxide carries out hydrolysis condensation selectively --- annular hydrolysis condensate is mentioned. As an example of the commercial item of hydrolysis condensate, annular aluminum oxide isopropanol PIRETO, poly (dibutyl titanate), etc. which are the trimers of aluminum TORISO propoxide can be mentioned. The compound (B) used by this invention is an organic silicon compound shown with a following general

formula (1), or a hydrolysis (portion) (condensation) thing of this organic silicon compound.



(However, as for Y, a hydrolytic basis, and m and n are the integers of 1-3, respectively, and an organic functional group and X satisfy m+n=4.)

As for Y, in the above-mentioned general formula (1), it is preferred that they are at least one sort chosen from an alkyl group, a cycloalkyl group, an aryl group, an aralkyl group, and an acyl group of bases which may be replaced. X --- a halogen atom and OR group (however, R --- a hydrogen atom and an alkyl group.) They are at least one sort chosen from a cycloalkyl group, an aryl group, an aralkyl group, and an acyl group of bases which may be replaced. And it is preferred that they are at least one sort chosen from a NH<sub>2</sub> group of bases which may be replaced.

[0017]As a compound (B), for example Vinyltrimethoxysilane, vinyltriethoxysilane, Vinyl system silane coupling agentN-(2-aminoethyl)-3-aminopropyl methyl dimethoxysilane, such as vinyltris (beta-methoxyethoxy) Silane and vinyltriacetoxysilane, 3-N-phenyl-gamma-aminopropyl trimethoxysilane, a N,N'-screw [3-(trimethoxysilyl) propyl] Amino \*\* silane coupling agents, such as ethylenediamine; Gamma-glycidyloxypropyltrimethoxysilane, beta- 3- 3- epoxy system silane coupling agent [ such as 4-EBOKI gardenia fruit clo hexyl ethyltrimethoxysilane, ] --- Krol system silane coupling agent [ such as 3-chloropropyltrimethoxysilane, ] --- meta-KUROKISHI system silane coupling agent [ such as 3-methacryloxy propyl trimethoxysilane, ], Mercapto system silane coupling agents, such as mercapto propyltrimethoxysilane; ketimine system silane coupling agentN, such as N-(1,3-dimethylbutylidene)-3-(triethoxy silyl)-1-propane amine - [2-(vinylbenzylamino)ethyl] Cation system silane coupling agents, such as 3-aminopropyl trimethoxysilane and a hydrochloride; Methyl trimethoxysilane, Various organic silicon compounds, such as alkyl system silane coupling agent,gamma-YUREIDO propyl triethoxysilane, such as trimethylmethoxysilane, decyltriethoxysilane, and hydroxyethyl trimethoxysilane, and hexamethyldisilazane, etc. are illustrated.

[Inorganic system particles, a surface modification method by which surface treatment was carried out] The inorganic system surface treatment particles of this invention are obtained by contacting the above-mentioned inorganic system particles to the two above-mentioned sorts of compounds (A) and (B). For example, the suspension object containing inorganic system particles is prepared, and this contact is performed by mixing two sorts of compounds (A) and (B) on this suspension object.

[0018]As a solvent used in order to prepare the suspension object containing inorganic system particles, An organic solvent's is preferred and For example, alcohols, ketone, aliphatic series, and aromatic carboxylate, Straight mineral oil, vegetable oil, a wax oil, silicone oil, etc. besides ether, ether ester species, aliphatic series and aromatic hydrocarbon, and halogenated hydrocarbon can be mentioned. As a desirable solvent, the boiling points in ordinary pressure are 40 ° - 250 ° from a point of flexibility. They are one sort or two sorts or more of mixed solvents chosen from alcohols, aliphatic series and aromatic hydrocarbon, halogenated hydrocarbon, aromatic series and aliphatic-carboxylic-acid ester species, ketone, ether (annular), ether ester species, and water. As the above-mentioned solvent, for example Methanol, ethanol, n-propanol, Isopropyl alcohol, n-butanol, ethylene glycol, propylene glycol, Ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, Ethylene glycol monobutyl ether, diethylene glycol monoethyl ether, Diethylene-glycol monobutyl ether, ethylene glycol methyl ether acetate, Ethylene glycol ethyl ether acetate, ethylene glycol butyl acetate, Propylene glycol monomethyl ether, propylene glycol monoethyl ether, Dipropylene glycol monomethyl ether, tripropylene glycol monomethyl ether, Propylene-glycol-methyl-ether acetate, propylene glycol ethyl ether acetate, 3-methyl-3-methoxybutanol, 3-methyl-3-methoxy butyl acetate, Toluene, xylene, benzene, cyclohexane, n-hexane, ethyl acetate, propyl acetate, butyl acetate, isobutyl acetate, methyl ethyl ketone, methyl isobutyl ketone, cyclohexanone, a tetrahydrofuran etc. can be mentioned --- these solvents --- one sort --- or two or more sorts are used.

[0019]Less than 1wt% of the moisture content contained in a solvent is preferred, and it is still more desirable. [ 0.5% or less of ] As for a compound (A) and a compound (B), it is preferred to dilute and use it to about 5 to 50% of the weight like inorganic system particles, using the organic solvent which may dissolve these. About the blending ratio of a compound (A), (B), and inorganic system particles. Although there is no limitation in particular, the loadings of a compound (A) are preferred in it being 0.0001-0.1mmol/m<sup>2</sup> in metal atom total amount conversion of a compound (A) to the specific surface

area ( $\text{m}^2/\text{g}$ ) of inorganic system particles, and still more preferred in it being  $0.001\text{--}0.04\text{mmol}/\text{m}^2$ .  
 [0020]Although there is no limitation in particular about an addition order at the time of mixing the suspension object and the compound (A) and (B) containing inorganic system particles, after mixing a compound (A) on a suspension object, it is preferred to mix a compound (B) further. About the containing inorganic system particles. Although there is no limitation in particular, as for after the compound (A) mixing, not less than  $50\text{ }^{\circ}\text{C}$  is preferred, it is still more preferred to heat for more than 10 minutes above  $100\text{ }^{\circ}\text{C}$ , and it is most preferred to heat for more than 30 minutes above  $100\text{ }^{\circ}\text{C}$ .  
 After the compound (B) addition is the same. Although heating may be performed under ordinary pressure, if it carries out under application of pressure, the rate of a surface treatment of a compound (A) and (B) will increase. It is desirable when the compound (A) and (B) is mixed heating a suspension object under application of pressure especially.

[0021]Stirring power until it is preferred to perform mixing of a compound (A) and (B) under stirring and it mixes a compound (B) for a compound (A) after mixing. Since it will become easy to produce secondary condensation if the stirring power after the compound (A) mixing is large, below  $10\text{ kw}/\text{m}^3$  is preferred, below  $1\text{ kw}/\text{m}^3$  is still more preferred, and  $0.01\text{--}1\text{ kw}/\text{m}^3$  is the most preferred. The suspension object after mixing the compound (A) and (B), it can condense and can be used as the below-mentioned solvent dispersing element, and also a binder component is added, and remaining as it is or after considering it as the constituent for membrane formation or removing a solvent by concentration hardening by drying or centrifugal separation, stoving can be carried out, and it can take out as a granular material, and can be considered as the constituent for shaping.

[0022]With the compound (A) and (B), since the surface treatment of the inorganic system particles of this invention is carried out, they have the characteristic of \*\* shown below - \*\*.

\*\* It is hard to be spoiled by that the presentation of particles, structure, a function, etc. are chemical, and a thermal effect, and chemical and thermal stability is high. For example, although  $\text{ZnO}$  system particles have low acid resistance, their acid resistance usually improves by carrying out a surface treatment. The  $\text{SnO}_2$  system which is a metallic oxide of heat ray cover nature and which was doped by Sb — the  $\text{In}_2\text{O}_3$  system doped by particles and Sn — heat ray cover nature falling in

particles and the  $\text{ZnO}$  system particles doped by In, if it heats under an oxidizing atmosphere, but, by carrying out a surface treatment, a heat-resistant oxidizing quality increases and heat ray cover nature becomes is hard to be spoiled by heating.

[0023]\*\* Exoel in dispersion stability.

\*\* The catalytic activity which is character peculiar to particles (light) is controlled, as a result, temporal gelling cannot get up easily, and weatherability improves.

[The use of the inorganic system particles by which surface treatment was carried out.] The inorganic system particle containing composition concerning this invention contains the inorganic system particles by which refining was carried out [above-mentioned]. Since the inorganic system particle containing composition concerning this invention contains the inorganic system particles by which surface treatment was carried out, temporal gelling cannot get up easily and its dispersion stability is high.

[0024]Although there is no limitation in particular about the content of inorganic system particles, generally  $0.01\%$  of the weight or more of the inorganic whole system particle containing composition and  $95\%$  of the weight or less are preferred. Especially the desirable content range changes with kinds of constituent. Constituents for membrane formation, such as a constituent for a dispersing element and coats, a constituent for shaping, etc. which, for example, make it to distribute the inorganic system particles by which surface treatment was carried out to carrier fluid, such as a solvent, a plasticizer, and various monomers, come as an inorganic system particle containing composition concerning this invention can be mentioned. A paint article can be obtained from the constituent for membrane formation, and a resin-molding article can be obtained from the constituent for shaping. Hereafter, these are explained in detail.

A dispersing element is a constituent which the inorganic system particles by which surface treatment was carried out distribute in a solvent, a plasticizer, and/or various monomers. Although the example made only the solvent distribute the inorganic system particles by which surface treatment was carried out, the example which only the plasticizer was

made to distribute, and the example which only the monomer was made to distribute are shown below, it cannot be overemphasized that a solvent, a plasticizer, and various monomers may be used together as carrier fluid.

[0025]— A solvent dispersing element—solvent dispersing element contains the inorganic system particles by which surface treatment was carried out, and contains a solvent further. The above-mentioned solvent can be mentioned as a solvent in this case. Although there is no limitation in particular about the content of the inorganic system particles in a solvent dispersing element, the whole solvent dispersing element is  $20\text{ to }50\%$  of the weight still more preferably  $10\text{ to }70\%$  of the weight preferably, and it is easy to deal with a solvent dispersing element in content of this amount. Although there is no limitation in particular about the content of the solvent in a solvent dispersing element — desirable —  $90\%$  of the whole solvent dispersing element — it is  $80\text{ to }50\%$  of the weight still more preferably  $30\%$  of the weight.

[0026]— A plasticizer dispersing element—plasticizer dispersing element contains a plasticizer further including the inorganic system particles by which surface treatment was carried out. As a plasticizer, there is no limitation in particular and in this case, for example, phosphoric acid tributyl, Phosphoric ester system plasticizers, such as phosphoric acid 2-ethylhexyl; Dimethyl phthalate, Phthalate ester plasticizers, such as dibutyl phthalate and phthalic acid octyldodecyl; Butyl oleate, Aliphatic ester—basic acid ester system plasticizers, such as glycerin monooleate; Aliphatic—dibasic—acid—ester system plasticizer; diethylene glycol dibenzoate, such as dibutyl adipate and di-2-ethylhexyl sebacate, Bivalence alcohol ester system plasticizers, such as triethylene glycol di-2-ethylbutyrate; a plasticizer with conventionally publicly known oxy acid ester system plasticizers, such as methyl acetyl ricinolate and acetyltributyl citrate, etc. can be mentioned.

[0027]Although there is no limitation in particular about the content of the inorganic system particles in a plasticizer dispersing element — desirable —  $5\%$  of the whole plasticizer dispersing element — it is  $20\text{ to }50\%$  of the weight still more preferably  $80\%$  of the weight. It is because it will be easy to deal with viscosity etc. low if it is content of this amount. The plasticizer dispersing element is useful as the below-mentioned constituent for shaping, especially an intermediate material of the interlayer for glass laminates. How to add the inorganic system particles by which refining was carried out to the plasticizer as a manufacturing method of a plasticizer dispersing element, for example, and distribute; heating solvent substitution of the above-mentioned solvent dispersing element can be carried out, and the method of obtaining a plasticizer dispersing element etc. can be mentioned.

[0028]— A monomer dispersing element—monomer dispersing element contains a monomer further including the inorganic system particles by which refining was carried out. As a monomer used for a monomer dispersing element. There is no limitation in particular and for example, acrylic system monomers, such as acrylic acid (meta) and acrylic ester (meta) (meta). Conventionally publicly known monomers, such as vinyl system monomers, such as styrene system monomers, such as styrene, vinyltoluene, and divinylbenzene, VCM/PVC, and vinyl acetate, can be mentioned.

[0029]Although there is no limitation in particular about the content of the inorganic system particles in a monomer dispersing element, it is because it will be easy to deal with viscosity etc. low preferably if the whole monomer dispersing element is  $20\text{ to }60\%$  of the weight still more preferably  $20\text{ to }80\%$  of the weight and it is content of this amount. The monomer dispersing element is useful for the use of the resin composition which carries out distributed content of the inorganic system particles, a resin-molding object, etc. The method of, for example, making a monomer adding and distributing the inorganic system particles by which refining was carried out as a manufacturing method of a monomer dispersing element etc. can be mentioned.

The constituent for membrane formation and the constituent for paint article membrane formation are inorganic system particle containing compositions which have membrane formation nature. Since this constituent for membrane formation contains inorganic system particles, its pot life is long, and the transparency of the coat obtained and its visible light transmittance state are high, and it is excellent in weatherability.

[0030]As a constituent for membrane formation, the inorganic system particles and binder component by which refining was carried out are used as an essential ingredient, for example. The constituent A for membrane formation in which the above-mentioned solvent is blended if needed; the inorganic system particles by which refining was carried out, and the above-mentioned solvent can be used as an essential ingredient, and the constituent B for membrane formation in which a binder component is



blended if needed can be mentioned. In the constituent for membrane formation, when the total quantity of inorganic system particles and a binder component is made into solid content, solid content is 10 to 70% of the weight of the whole constituent preferably, and it is 25 to 50 % of the weight still more preferably. The constituent A for membrane formation can make the film which distributed inorganic system particles in the binder component form in the base material surface of a high polymer film, glass, etc. On the other hand, the constituent B for membrane formation can make the inorganic film which consists only of a mineral constituent of inorganic system surface treatment particles form by performing heat treatment including the pyrolysis for flying eventually from the binder component blended if needed. Since inorganic system particles are manufactured from the high-distributed constituent for membrane formation, any film turns into a film excellent in surface smoothness, or homogeneity and transparency. In the latter inorganic film, it can become a tough film mechanically also under heat treatment temperature lower than before according to the above-mentioned quantity dispersion effect.

[0031] The content of the inorganic system particles in the constituent A for membrane formation. Although there is no limitation in particular, from points, such as a membranous mechanical strength, adhesion with a substrate, and flexibility, preferably, it is 30 to 45 % of the weight most preferably 20 to 55% of the weight still more preferably ten to 70% of the weight to inorganic system particles and the solid content total quantity of a binder component (when using additive agents, such as a hardening agent, they are also included in the amount of binder components.). However, in a use with contact important as a membranous function like an electric conduction preventing film, an antistatic film, and an electrostatic preventing film between inorganic system particles, it is 40 to 80 % of the weight still more preferably 30 to 90% of the weight preferably.

[0032] Although there is no limitation in particular about the content of a binder component in the constituent A for membrane formation, it is 80 to 45 % of the weight still more preferably 90 to 30% of the weight preferably to the solid content total quantity of the constituent for membrane formation. Although there is no limitation in particular about the content of a solvent in the constituent A for membrane formation — desirable — 90- of the whole constituent for membrane formation — it is 75 to 50 % of the weight still more preferably 30% of the weight. Although there is no limitation in particular, the concentration of the inorganic system particles in the constituent B for membrane formation has the preferred one where particle concentration is higher, in order to consider it as a film with many high functions, such as high conductivity by inorganic system particles contacting electromagnetic-shielding nature, heat ray cover nature according to polycrystal membrane-ization and single-crystal-membrane-izing further. The content of the inorganic system particles in the constituent B for membrane formation is 60 to 95 % of the weight still more preferably 40 to 100% of the weight preferably to said solid content total quantity contained in the constituent B for membrane formation. In order to consider it as the thin film which is excellent in ultraviolet-rays cover nature or heat ray cover nature in the content of inorganic system particles being less than 40 % of the weight, it is necessary to thicken membranous thickness and there is a possibility that the productivity at the time of manufacture may fall.

[0033] Although there is no limitation in particular about the content of a solvent in the constituent B for membrane formation, it is 60 to 90 % of the weight still more preferably 50 to 98% of the weight preferably to said solid content total quantity of the constituent for membrane formation. Although there is no limitation in particular about the content of a binder component in the constituent B for membrane formation, it is 40 or less % of the weight more preferably 60 or less % of the weight to said solid content total quantity of the constituent for membrane formation. As a binder component blended with the constituent for membrane formation, Organic system binders, such as various synthetic resins of plasticity or hardenability (concomitant use of thermosetting, ultraviolet curing nature, electron beam hardenability, moisture curing nature, and these many performances, etc. are included) and a natural resin, an inorganic system binder, the various monomers corresponding to said synthetic resin, etc. can be mentioned.

[0034] As a synthetic resin, for example Alkyd resin, amino resin, polyvinyl resin, An acrylic resin, an epoxy resin, polyamide resin, polyurethane resin, Thermosetting unsaturated polyester resin, phenol resin, chlorinated polyolefin resin, silicone resin, acrylic silicone resin, a fluoro-resin, xylene resin, petroleum resin, ketone resin, rosin denaturation maleic acid resin, liquid polybutadiene, coumarone resin, etc. can be mentioned — these — one sort — or two or more sorts are used, as a natural

resin, shellac, rosin (turpentine), rosin ester, hardened rosin, decolorization shellac, white shellac, etc. can be mentioned, for example — these — one sort — or two or more sorts are used.

[0035] As a synthetic resin, the rubber of nature, such as ethylene-propylene copolymerization rubber, polybutadiene rubber, a styrene butadiene rubber, and acrylonitrile butadiene copolymerization rubber, or composition, etc. may be used. As an ingredient used together with a synthetic resin, a cellulose nitrate, cellulose acetate butyrate, cellulose acetate, ethyl cellulose,

hydroxypropylmethylcellulose, hydroxyethyl cellulose, etc. can be mentioned. About the gestalt of a binder component, there is no limitation in particular and a solvent meltable type, a water soluble type, an emulsion type, distributed type (arbitrary solvents, such as water/organic solvent), etc. can be mentioned.

[0036] As a binder component of a water soluble type, water-soluble alkyd resin, water-soluble acrylic modification alkyd resin, water-soluble oil free alkyd resin (water-soluble-polyester resin), water soluble acrylic resin, water-soluble epoxy ester resin, water-soluble melamine resin, etc. can be mentioned, for example. As an emulsion type binder component, for example An alkyl acrylate (meta) copolymerization dispersion; vinyl-acetate-resin emulsion, A vinyl acetate copolymerization resin emulsion, an ethylene-vinyl acetate copolymerization resin emulsion, An acrylic ester (\*\*\*) polymerization resin emulsion, a styrene acrylic ester (\*\*\*) polymerization resin emulsion, an epoxy resin emulsion, a urethane resin emulsion, an acrylic silicone emulsion, a fluoro-resin emulsion, etc. can be mentioned.

[0037] As an inorganic system binder — silica — metal alkoxides, such as sol, alumina sol, alkali silicic acid, aluminum alkoxide, and a silicon alkoxide, these (hydrolysis) condensates, an phosphate, etc. can be mentioned. When using the constituent A for membrane formation for manufacture of functional films, such as the below-mentioned ultraviolet absorption nature film, etc., from a viewpoint of film formation conditions, such as forming temperature, the flexibility of the film obtained, or weatherability. As a binder component used for the constituent for membrane formation, polyurethane resin, an acrylic resin, a fluoro-resin, etc. are preferred. As a binder component used with the constituent B for membrane formation, when it heats, the inorganic system binder changed into a metal (water) oxide by a pyrolysis etc., the organic system binder with which a binder component does not remain in the thin film obtained by a pyrolysis etc., etc. are preferred.

[0038] As a solvent contained in the constituent for membrane formation, for example Alcohols, aliphatic series, and aromatic carboxylic acid ester, organic system solvent, water, straight-mineral-oil, vegetable oil, such as ketone, ether, ether ester species, aliphatic series and aromatic hydrocarbon, and halogenated hydrocarbon, a wax oil, silicone oil, etc. can be mentioned — these — one sort — or two or more sorts are used. In the constituent A for membrane formation, a solvent is suitably chosen by the kind of the purpose of use and binder component. The constituent A for membrane formation also contains a binder component as an essential ingredient besides inorganic system particles. According to a military requirement, in addition to these, Hardening agent [ such as a cross linking agent J; Curing catalyst of a hardening auxiliary agent etc. plasticizer; — defoaming agent and leveling agent; — thixotropic agent; — flattening — surface-active agent; — fire retardant; — paints wetting agent and dispersing agent; — lubricant; — ultraviolet ray absorbent; — light stabilizer; — antioxidant; — in addition to this (heat) — stabilizer; — antiseptic; — antifungal agent; — seaweed-proofing agent; — corrosion prevention and rust-proofer; — color; — additive agents, such as paints, may be contained.

[0039] Weatherability improves that the constituent A for membrane formation is a thing containing light stabilizer. Flexibility is high in the constituent A for membrane formation being what contains polyisocyanate as a hardening agent. About the curing method of the constituent A for membrane formation in the case of manufacturing a film, although arbitrary curing methods, such as an ultraviolet curing method, the electron beam hardening method, a moisture curing method, and a heat cure method, can be adopted, a heat cure method is economically preferred. As a manufacturing method of the constituent A for membrane formation, after adding and slurring inorganic system particles to solvents, such as an organic solvent, the method of mixing a binder component and manufacturing this inorganic system particle, for example,

[0040] As a manufacturing method of the constituent B for membrane formation, the method of adding, slurring and manufacturing inorganic system particles to solvents, such as an organic system,

etc. can be mentioned, for example. The constituent for membrane formation can be applied to the surface of the below-mentioned substrates, such as inorganic substances, such as glass and earthenware, and organic matters, such as resin, for example. Hereafter, the paint article obtained from the constituent for membrane formation is explained in detail. The 1st paint article that a paint article comes to form the film obtained from the above-mentioned constituent for membrane formation on the surface of a substrate, and forms the tunic obtained from the constituent A for membrane formation on the surface of a substrate. There is the 2nd paint article that forms the thin film of an inorganic system in the surface of said substrate by applying and heating the constituent B for membrane formation to a base material surface.

[0041] Since the 1st paint article equips the surface with the tunic obtained from the constituent A for membrane formation which inorganic system particles high-distributed, it may have a various function based on the kind of inorganic system particles, such as ultraviolet-rays cover nature, heat ray cover nature, etc. besides [outstanding] transparency. This tunic is useful to an ultraviolet-rays screen, a heat ray screen, an artistic film, photocatalyst membrane, an infrared radiation film, thermoelectrical converting membrane, etc. As a substrate used for the 1st paint article, substrates, such as inorganic substances, such as glass, earthenware, and metal (for example, steel), and organic matters, such as resin, can be mentioned, especially the tunic produced by applying the constituent A for membrane formation to the base material surface of an organic matter has high weatherability, and it excels in flexibility, for example. About the shape of the above-mentioned inorganic substance or an organic matter, there is no limitation in particular and shape, such as film state, a sheet shaped, tabular, and fibrous, can be mentioned. Also among these, it is useful for a film, textiles, etc.

[0042] There is no limitation in particular as resin for substrates in the 1st paint article. For example, LDPE, HDPE, amorphous polyethylene, OPP (extension polypropylene), Polypropylene, such as OPP (crystallization polypropylene), Polyolefin systems, such as polyisobutylene; EVA (Ethylene-vinyl acetate copolymer) system; — polystyrene system; — elasticity or rigid-polyvinyl-chloride; — EVOH (ethylene vinyl alcohol copolymer) system; P VA system (vinyl system); P VDC system (polyvinylidene chloride); — polyethylene terephthalate and polyethyleneterephthalate. Polyester system [such as polybutylene naphthalate, ]; polycarbonate system; — polyurethane system; — polyamide system; — polyimide system; — polyacrylonitrile system; — Pori Sall John system; — polyether sulphone system; — polyphenylene sulfide system; — polyarylate system; — polyether imide system; — aramid system; (meta-) acrylic; — polyether ether ketone system; — a tetrafluoroethylene ethylene copolymer, a tetrafluoroethylene hexafluoropropylene copolymer, polytetrafluoroethylene, polytrifluoroethylene, polyvinylidene fluoride, and polyvinyl fluoride. A tetrafluoroethylene perfluoro-alkyl vinyl ether copolymer, Fluororesin, such as polyvinyl fluoride, a tetrafluoroethylene hexafluoropropylene perfluoro-alkyl vinyl ether copolymer, and polychlorotrifluoroethylene resin, etc. can be mentioned.

[0043] As resin for substrates of the 1st paint article in the use as which the very advanced visible light transmittance state of an optical lens etc. and transparency are required, A PMMA and MMA-styrene random copolymer, polycarbonate, Copolymers, such as transparent polypropylene, MMA, alpha-methylstyrene, or cyclohexyl methacrylate. The MMA denaturation type of ABS plastics, polystyrene, polyarylate, Pori Sall John, Various resin, such as polyether sulphone, transparent-epoxy-resin, Poly 4-methylpentene-1, fluorinated polyimide, amorphous-fluorocarbon-resin, transparent phenoxy resin, and amorphous nylon resin and a fluorene series, can be used.

[0044] It becomes more important future still to use biodegradable resin from a viewpoint of discarding treatment as an object for the substrates of the 1st paint article that meets the demand to biodegradability. As such biodegradable resin, for example Poly 3-hydroxy butyrate, it is preferred to use biodegradable plastics, such as a kitchen chitosan system, a polyamino acid system, a cellulose type, a polycaprolactone system, an alginic acid system, a polyvinyl alcohol system, an aliphatic polyester system, a sugars system, a polyurethane system, and a polyether system, etc. Fluororesin, polyester system resin, acrylic (meta) resin, and polycarbonate system resin are preferred at the point that weatherability is high among a plastic film and a sheet also about the inside of these resin used as a raw material for substrates.

[0045] It may be the purpose of improving as a substrate the adhesion etc. of what arranged the ultraviolet absorption film on the above-mentioned substrate beforehand, and the tunic and substrate which are obtained from the constituent A for membrane formation, and the thing thing which allotted

the primer layer etc. beforehand may be used. About the method of applying the constituent A for membrane formation to a base material surface, there is no limitation in particular and a dipping method, the roll coater method, the flow coat method, screen printing, the bar coating-machine method, the spin coater method, brush painting, a spray method, etc. can be mentioned. After applying the constituent A for membrane formation, in order to raise physical properties, such as chemical resistance, such as a water resisting property, solvent resistance, acid-proof, and alkali-proof, and abrasion-proof nature, it is preferred to make it harder by methods, such as heat curing (room temperature curing is included), moisture curing, ultraviolet curing, and electron beam hardening.

[0046] There is no limitation in particular about the dry membrane thickness of the tunic obtained from the constituent A for membrane formation, and it is 0.1–60 micrometers preferably. For example, when using this tunic for the purpose of ultraviolet-rays cover, When the dry membrane thickness of a tunic is 1–10 micrometers most preferably and uses 0.5–30 micrometers of this tunic for the purpose of heat ray cover still more preferably, 2–35 micrometers of dry membrane thickness of a tunic are 5–15 micrometers most preferably still more preferably, and when using this tunic for the purpose of the prevention from electrification (electrostatic), 0.2–5 micrometers of dry membrane thickness of a tunic are 0.5–2 micrometers most preferably still more preferably. Although there is no limitation in particular about Hayes of the tunic obtained from the constituent A for membrane formation, it is 0.5% or less 1% or less still more preferably 2% or less 3% or less preferably. Hayes is the value produced by measuring with a turbidity meter.

[0047] A glass laminate can be obtained if a coating transparent plate provided with the interlayer produced by applying the constituent A for membrane formation to transparent plates, such as a glass plate, is used. Although an interlayer and the glass laminate using this are described also later, this glass laminate can be manufactured in piles so that an adhesive sheet may be inserted with a coating transparent plate and the transparent plate prepared independently. The interlayer and adhesive sheet of a coating transparent plate are piled up at this time. In this case, as an adhesive sheet, the sheet which makes construction material elasticity resin or rigid resin, such as polyvinyl-butyl system resin, polyurethane resin, ethylene-vinylacetate copolymer system resin, and ethylene-(meta) acrylic ester copolymer system resin, can be mentioned, and elasticity resin is preferred. The thickness of an adhesive sheet is 0.5–1 mm still more preferably 0.1–2 mm preferably. [0048] When using a film as a substrate, there is no limitation in particular about the thickness of a base film, and 5–500 micrometers is 10–200 micrometers still more preferably. Although there is no limitation in particular about a method, dry membrane thickness, etc. which apply the constituent A for membrane formation to the base film surface, having mentioned above is referred to preferably. If the tunic with which an inorganic system particle content film is obtained from the constituent A for membrane formation is formed on a base film, there will be no limitation in particular, and according to a use, demand characteristics, etc., it could be processed further. The surface of a tunic where an inorganic system particle content film does not touch a base film, and/or Or the thing in which an adhesive layer and protective layers (hard court film for abrasion-proof nature grant, etc.) were formed on the surface of the base film which does not touch a tunic may be used, and they may be other films and the laminated laminate film.

[0049] Next, the 2nd paint article forms the thin film of an inorganic system in the surface of said substrate by applying and heat-treating the constituent B for membrane formation to an above-mentioned base material surface. As a substrate used for the 2nd paint article, that whose heat-resistant temperature is not less than 300 °C is preferred, for example, inorganic substances, such as glass, earthenware, and metal (for example, steel), etc. are preferred. In order that an inorganic system thin film may use the oxide (water) originating in inorganic system particles, etc. as an essential ingredient, the paint article B has the outstanding ultraviolet-rays cover nature and heat ray cover nature, and is excellent in the weatherability of a thin film, and water-white nature. This inorganic system thin film is useful as an ultraviolet-rays screen, a heat ray screen, an electromagnet-shielding film, the conducting film of a transparent electrode, an artistic film, photocatalyst membrane, an infrared radiation film, thermoelectrical converting membrane, etc. [0050] Although there is no limitation in particular about the cooking temperature at the time of performing the above-mentioned heat treatment, there is 400–800 °C 300–1400 °C still more preferably. There is a possibility that the mechanical strength of an inorganic system thin

film may fall that cooking temperature is less than 300 °C. When cooking temperature exceeds 1400 °C, it becomes on the other hand, less practical. Although it may be more desirable to perform it under the oxidizing gas atmosphere of the air middle class since heating promotes a pyrolysis and combustion. Eventually to obtain a conducting film etc. Under the inert gas atmosphere of nitrogen etc., Although it is preferred to carry out under reducing gas atmospheres, such as hydrogen, or a vacuum, since the surface treatment of the inorganic system particles is carried out with the compound (A) and (B), even if the oxidation resistance is high and does not heat-treat under inactive gas or a reducing gas atmosphere, a conducting film and a heat ray screen can be obtained.

[0051] There is no limitation in particular about the thickness of an inorganic system thin film, and 0.1-10 micrometers is 0.2-4 micrometers still more preferably. Although there is no limitation in particular in the 1st and 2nd paint article about the visible light transmissivity, it is not less than 80% most suitably not less than 75% still more suitably not less than 70%. Visible light transmissivity is the value which measured in 380-780 nm of the wavelength ranges, and was obtained with the device, measuring method, and calculation method of the JIS R3106 statement. Although there is no limitation in particular in the 1st and 2nd paint article about the Hayes, it is 1% or less 3% or less still more suitably 5% or less 10% or less suitably. Hayes is the value produced by measuring with a turbidity meter.

The constituent for shaping and the constituent for resin-molding article shaping contain the organic resin which can form the continuous phase by which the inorganic system particle by which surface treatment was carried out, and this inorganic system particle are distributed. A plasticizer is blended further if needed. Since this constituent for shaping contains inorganic system particles, its dispersion stability is high, and the transparency of the resin-molding article obtained from this constituent and its visible light transmittance state are high, and it is excellent in weatherability.

[0052] The constituent for shaping can contain various resin additives, such as a thermosetting agent, antioxidant, light stabilizer, an antifungal agent, a color, paints, a spray for preventing static electricity, and an ultraviolet ray absorbent, in the usual quantity if needed. The content of the inorganic system particles in the constituent for shaping and organic resin, Although not limited in particular, 0.01 to 95 % of the weight of inorganic system particles and 5 to 99.99 % of the weight of resin are 0.05 to 50 % of the weight of inorganic system particles, and a rate of 0.1 to 20 % of the weight of resin preferably to these both solid content total weight. If the content of inorganic system particles exceeds a mentioned range, the mold goods which are satisfactory in a mechanical strength may not be obtained, and when less, there is a problem that the blending effect of inorganic system particles is not fully demonstrated.

[0053] The content (sum total) of a plasticizer in the constituent for shaping in case the plasticizer like the above-mentioned is blended is usually 2 to 70 % of the weight to the total amount of the constituent for shaping. In less than 2 % of the weight, the effect which adds a plasticizer is hard to be acquired, and if it exceeds 70 % of the weight, physical properties stable as a Plastic solid may not be acquired. Although the kind in particular of molding resin used for the constituent for shaping is not limited but it is suitably chosen according to the purpose of use, For example, polyolefin resin; polystyrene resin; vinyl-chloride-resin; vinylidene-chloride-resin; polyvinyl-alcohol-resin; polybutyl resin, such as ## polyethylene and polypropylene; Polyethylene terephthalate, polyester resin [ such as polyethylenesapthalate, J; --- polyamide resin; --- polyimide resin; --- acrylic resins (meta-), such as polymethyl (meta-) acrylate, phenol resin; --- urea resin; --- melamine resin; --- unsaturated-polyester resin; --- polycarbonate resin; --- the thermoplasticity of an epoxy resin etc., or thermosetting resin. ## A synthetic rubber or crude rubber, such as ethylene propylene copolymerization rubber, polybutadiene rubber, styrene butadiene, and an acrylonitrile butadiene rubber, etc. is illustrated, any one is used alone or two or more are used together.

[0054] Although the method in particular of manufacturing the constituent for shaping is not limited but the constituent for shaping made into the purpose by mixing and distributing inorganic system particles in resin in short is obtained, specifically, the following methods are adopted. Namely, for example, when carrying out melt kneading of a pellet type or the powdered molding resin. The masterbatch method mixed with a pellet type or powdered resin to the powder of inorganic system particles. Dissolve resin beforehand and mixture dispersion of the inorganic system particles is carried out to this solution, Spray plane of the method that the method of removing a solvent after that, etc. are conventionally publicly known, and the solvent dispersing element of inorganic system

particles is carried out to a pellet type or the powdered resin surface. By evaporating a solvent beforehand, inorganic system particles prepare the thing made to adhere to the pellet of resin, or the powdered resin, and can adopt the method of carrying out melt kneading of this.

[0055] The method of carrying out mixture dispersion of the inorganic system particles in the process in which molding resin is manufactured, as an exception method, For example, when molding resin is polyester resin, the method of carrying out addition mixing of the dispersing element which makes the glycol which is a raw material of polyester come to distribute the powder of inorganic system particles can also be adopted at the inside of the manufacturing process of polyester, i.e., the arbitrary stages of a series of processes in an ester exchange reaction - a polymerization reaction. the case where raise the processability at the time of a fabricating operation, flexibility is given, or there is necessity --- a plasticizer --- one sort or two sorts or more, and/or said plasticizer dispersing element of inorganic system particles carried out --- one sort --- or two or more sorts can add. Each addition is suitably chosen according to the kind of resin, processing conditions, the purpose of use, etc.

[0056] If an above-mentioned method is followed, the constituent for shaping in which inorganic system particles were uniformly distributed in molding resin will be obtained. As for the constituent for shaping, not only powder state but a pellet etc. can take the gestalt needed for the usual molding material. The resin-molding article excellent in transparency which is carrying out distributed content of the inorganic system particles uniformly, and has various kinds of functions described by the paragraph of the constituent for membrane formation can be obtained by fabricating the constituent for shaping produced by making it above to tubular, a sheet shaped, film state, fibrous, etc. It will be as follows if an example of a method which obtains various kinds of resin-molding articles from the constituent for shaping is described more concretely.

[0057] To obtain the polycarbonate resin plate which carries out distributed content of the inorganic system particles. For example, by carrying out melt kneading of a polycarbonate resin pellet or powder, and the powder of the inorganic system particles of the specified quantity. After inorganic system particles obtain in resin the constituent for shaping mixed uniformly, once pelletizing [ continuously or ] as it is, the method of processing tabular [ of plane or curved surface shape ] is adopted by injection molding, extrusion molding, compression molding, etc. Of course by carrying out post processing of this plate-like Plastic solid, it is also possible fabricating in arbitrary shape, such as the shape of a corrugated panel, and by controlling the thickness of a Plastic solid to fabricate in the arbitrary thickness from a thick plate to a film. In various resin, such as acrylic resin, VCM/PVC system resin, polyester system resin, and fluororesin, it is obtained similarly.

[0058] To obtain films which carry out distributed content of the inorganic system particles, such as textiles, such as a nylon fiber and polyester fiber, a polyolefin film, a polyamide film, polyester film. For example, by carrying out melt kneading of the inorganic system particle powder to a resin pellet or powder. After inorganic system particles obtain in resin the constituent for shaping distributed uniformly, once pelletizing [ continuously or ] as it is, it fibroses by the conventionally publicly known fibrosis methods, such as melt spinning, or film--izes by extrusion molding, and extension operation is performed for this film to one axis or biaxial if needed. In order to obtain the polyester fiber which carries out distributed content of the inorganic system particles. For example, glycol is made to distribute inorganic system particles at 0.1 to 50% of the weight of a rate, This dispersing element is added at the inside of the manufacturing process of polyester, i.e., the arbitrary stages of a series of processes in an ester exchange reaction - a polymerization reaction, the polymerization reaction of polyester is completed, and melt spinning of the obtained polyester polymerization thing is conventionally carried out in accordance with a publicly known method after that. On the other hand, in order to obtain the polyester film in which inorganic system particles were distributed, the polyester polymerization thing obtained like the above is extruded to film state by extrusion molding, and stretching treatment is performed in one axis or the biaxial direction after that if needed.

[0059] Into a resin-molding article, the laminated film sheet which contains the layer containing inorganic system particles one layer or more than two-layer is also contained, and this laminated film sheet is used as packaging films including food packing, a heat insulation film, a gas barrier film, an agricultural film, etc. As a process of this laminated film sheet, the inorganic system particle distribution film sheet obtained as mentioned above. [ whether it laminates by the method of carrying out heating weld with the film sheet which does not contain inorganic system particles, the method of



pasting up, etc., and ] The method of applying the above mentioned inorganic system particle containing composition to the film sheet which does not contain inorganic system particles, etc. are mentioned. When carrying out extrusion molding of the film sheet (it may have functionality) used as a substrate as an option, A laminated film sheet is obtained by carrying out a co-extrusion, using the powder and pellet of the resin which does not contain inorganic system particles, and the powder and pellet of resin containing inorganic system particles as a raw material. As a device used in that case, the conventionally publicly known extrusion-molding machine used for manufacture of a multilayer film sheet can be used.

A glass laminate and an interlayer glass laminate are provided with the transparent plate of two sheets at least, and consist of composition that the interlayer is pinched among these transparent plates.

[0060]As for the above-mentioned interlayer, what a sheet shaped comes to fabricate an inorganic system particle constituent, and contains inorganic system particles, a plasticizer, and resin (especially elasticity resin) is preferred. The plasticizer mentioned above in the plasticizer dispersing element as an example of a plasticizer can be mentioned. As elasticity resin, although there is no limitation in particular, polyvinyl-butyl system resin, polyurethane system resin, ethylene-vinylacetate copolymer resin, ethylene-(meta) acrylic ester copolymer resin, etc. can be mentioned as a desirable thing. Although the content of the inorganic system particles contained in an interlayer changes with the shield mechanisms of the ultraviolet rays of the thickness of an interlayer, and inorganic system particles, or a heat ray, etc., it is usually 0.1 to 5 % of the weight. The content of the inorganic system particles of per 1 m of film surface  $^2$  of an interlayer has  $1-25\text{ g/m}^2$ , especially preferred  $1-15\text{ g/m}^2$ .

[0061]As for a plasticizer and resin, it is preferred to form 90 to 99.9% of the weight of the whole interlayer. And the mutual ratios of a plasticizer and resin are that a plasticizer occupies 10 to 40 % of the weight most preferably ten to 50% of the weight still more preferably two to 70% of the weight to the total quantity of a plasticizer and a resinous principle, although there is no limitation in particular about the thickness of an interlayer — usually — it is 0.3-0.9 mm still more preferably 0.2-1.2 mm preferably 0.1-2 mm. Although there is no limitation in particular about the ultraviolet ray transmission of an interlayer, it is 10% or less most preferably 20% or less still more preferably 50% or less. Ultraviolet ray transmission is the value calculated according to the method of 3106 to JIS R1985 statement using the spectral transmittance of the light of the range of 340-380-nm wavelength, and the weighting factor (the same weighting factor as using when calculating solar transmittance) of each wavelength.

[0062]Although there is no limitation in particular about the infrared ray transmission (heat ray transmissivity) of an interlayer, it is 50% or less most preferably 60% or less still more preferably 70% or less. Infrared ray transmission is the value calculated according to the method of 3106 to JIS R1985 statement using the spectral transmittance of the light of the range of 800-1800-nm wavelength, and the weighting factor (the same weighting factor as using when calculating solar transmittance) of each wavelength. Since the needs for the optical selection screen which is excellent in transparency with a glass laminate are great, as inorganic system particles, heat ray cover nature particles and/or ultraviolet-rays cover nature particles are preferred. Since high transparency is required, the primary particle diameter of 0.05 micrometer or less is preferred, 0.03 micrometer or less is still more preferred, and 0.02 micrometer or less is the most preferred. The heat ray cover nature particles of points, such as the endurance of a glass laminate and the supply nature of the inorganic system particles of said particle diameter range, to a metallic-oxide system or ultraviolet-rays cover nature particles are preferred.

[0063]To the manufacturing method of an interlayer and a glass laminate, there is no limitation in particular and a publicly known method can be applied as it is conventionally. As a desirable manufacturing method which obtains the interlayer which high-distributed inorganic system particles, inorganic system particles are usually 5 to 80 % of the weight (preferably) in a plasticizer. After carrying out mixed kneading of the plasticizer dispersing element high-distributed to 30 to 50% of the weight in that it is easy to deal with viscosity etc., the plasticizer which does not contain inorganic particles, and the resinous principle, the method of obtaining an interlayer can be mentioned by fabricating by the mold extrusion method of a conventional method, the calendaring roll method, etc. to a sheet shaped. A glass laminate can be obtained by glass laminate-ized processing using an

interlayer and a transparent plate.

[0064]Inorganic glass; organic glass, such as clear glass It is [ a glass plate ] preferred it and transparent with the minerals manufactured with the float glass process as a transparent plate, colored glass, green system glass, bronze system glass, and gray system glass; the composite glass of these, etc. can be mentioned. The glass laminate of the transparent functionality which inorganic system particles high-distributed is obtained by glass laminate-ized processing sandwiching an interlayer between the glass plates of two sheets, and carrying out preliminary adhesion at about 70-110 % under decompression for example, next performing this adhesion at 120-160 % among autoclave and under application of pressure.

[0065]The glass laminate cannot make ultraviolet rays and infrared rays (a heat ray is included) penetrate easily, for example, is used for window materials, such as a car and a train, the window material of a building, etc. The inorganic system particle containing composition of this invention, for example Food packing, packaging of medical products, The various film canisters for a package, agricultural film which are used for the package for electronic industry materials, etc., The protective films for greenhouses, the object for building materials, for cars, etc., a building, a car, It can use for protective coat materials for spectacle lenses, such as textiles and sunglasses, an umbrella, a sunroof, cosmetics, etc. which are excellent in the cool feeling or warmth retaining property for garments, such as an adhesion film usable to window materials, such as a high temperature furnace, an adhesive film or a paint, clothes, and a hat, and ultraviolet rays and infrared rays can be intercepted effectively.

[0066]An inorganic system particle containing composition can be used for a paint useful also into bar code materials, such as a stealth bar code, a film, etc. It can use for electric conduction-ization of the formation of electrification prevention of various scopes, such as windows for vehicles, such as a clean room and a car, garments, various CRT, and LCD, a touch panel, etc., the recording form for facsimiles, etc., etc. with various gestalten, such as membrane formation material, a film, and paper. An inorganic system particle containing composition can be used as coating components for forming the transparent conducting film used by the solar cell, various displays, the touch panel, a photo sensor, etc.

[0067]

[Example]Although the example and comparative example of this invention are shown collectively below, this invention is not limited to the following example. Meaning "of the weight" %, "a part" means a "weight section." Evaluation in the following examples and comparative examples was performed with the following technique.

The evaluation 1 crystalline-powder X diffraction of inorganic system particles estimated.

[0068]2) Crystallite diameter D<sub>w</sub> powder X diffraction measurement was performed, analysis by the Wilson's method was conducted among the X diffraction peaks of each particle about about 3 line (they are three peaks to order with high diffraction peak intensity), and it asked for the size of microcrystal.

3) The amount of surface treatments (coating weight)

The cake obtained by centrifuging the dispersing element of the particles after a surface treatment is diluted with the same solvent as a dispersing element (it dilutes with the amount of solvents of 100 times the amount of the particles in dispersing element ). By carrying out vacuum drying of the settings obtained by repeating the operation to centrifuge twice at 120 %, by obtaining powder and conducting X-ray fluorescence of this powder, the quantity of the finishing agent combined with particles was calculated, and this was made into the amount of surface treatments (coating weight). Coating weight was expressed as the quantity of the processing agent to the specific surface area before the surface treatment of particles. Here, coating weight was calculated by X-ray fluorescence. Specific surface area measured the B.E.T. surface area of particles, and made it specific surface area.

[0069]4) The rate of coating weight was made into processing efficiency to the addition of the finishing agent to processing efficiency particles.

5) It is about dynamic light scattering photometer DLO-700 of Otsuka Electronics Co., Ltd. about a distributed particle diameter solvent dispersing element and a plasticizer dispersing element. It used, the number average particle diameter d<sub>n</sub> was measured, and the following standards estimated. d<sub>n</sub><0.1 micrometer. O<sub>d</sub>>0.1-micrometerx6 dispersion-stability dispersion stability was judged on

the following standards when the dispersing element was settled for one month into a 25 \*\* thermostatic-bath tub.

[0070] — x gelling of was not done, but 90 cc of paints were taught to the pot-life 100cc [ of evaluation 1 pint of :O coating composition ] screw pipe, and aging of the viscosity of the paint after hardening agent addition was measured. During measurement, the degree of solution temperature of the paint was held at 20 \*\* ±1 \*\*, was stirred by the magnetic stirrer, and was performed. Measurement of viscosity was based on the Brookfield viscometer. The mobility of liquid decreased and the time of stirring by a magnetic stirrer becoming impossible was made into gel time. Hayes was measured with evaluation 1 transparency turbidity meters (Nippon Denshoku Industries Co., Ltd. make NDH-1001 DP), such as a coating article.

[0071] In \*\*H(Hayes of coating article)- (Hayes of a substrate), it was considered as \*\*H 2% or less:O and \*\*H>=2%.

2) When not less than 360 nm of ultraviolet-rays cover nature had out wavelength, it was considered as O, and when that was not right, it was considered as x.

2) The case where the transmissivity T2.0 to the transmissivity T1.5 or 2-micrometer light to 1.5 micrometers of heat ray cover nature light was all 50% or less was made into those with heat ray cover nature (O). When that was not right, it was considered as those without heat ray cover nature (x).

[0072]3) The accelerated weathering test was done on weatherproof JIS B 7753-93 using the sunshine carbon arc light type lightfastness and the weather meter of a statement. In accordance with the following valuation basis, it evaluated from change of the transparency after a 1000hr examination further on the basis of the 200-hour back of the first stage.

A. In less than 3%B:Hayes change, not less than 3% of less than 6%:Hayes change is [ the Hayes change ] the not less than 6% example 1. The manufacture-example 1(1)-addition tub of a solvent dispersing element, the distillate line which has a cooler, and the application-of-pressure reaction vessel provided with the agitator — an ITO ultrafine particle (Sn-content: — Sn/In=5-mol%). Crystallite diameter Dw = suspension object which 9 nm distributes by 10wt% of concentration in toluene. Carrying out temperature up and stirring at 100 \*\*, after teaching 1000 copies and replacing gaseous phase atmosphere by nitrogen (stirring power requirement: 1kw/m<sup>3</sup>). Addition mixing was carried out having covered 120 copies of toluene solutions which contain aluminum tri-sec butoxide at 10wt% for 5 minutes from the addition tub as a compound (A).

[0073]After carrying out addition mixing, the suspension object (11a) was acquired by holding at the bottom product temperature of 100 \*\* for 2 hours. Next, after having applied to the suspension object (11a) held at 100 \*\* for 5 minutes, carrying out addition mixing and holding 130 copies of toluene solutions which contain decyltrimethoxysilane at 10wt% at 100 \*\* as a compound (B) for 5 hours, the suspension object (11b) was acquired by cooling. By condensing the acquired suspension object (11b) by an evaporator, particulate concentration 30wt% of the toluene dispersing element (S-1) was prepared.

— example 1(2)-Sb content SnO2 ultrafine particle (Sb content: — Sb/Sn=4-mol%). After carrying out addition mixing of 40 copies of crystallite diameter Dw=6-nm powder at 200 copies of methyl ethyl ketone and mixing 14 copies of aluminum NIUMUTORI sec butoxide as a compound (A) to this, the suspension object (12a) was acquired by carrying out 2 time processings by a sand mixer. To this, it is methyl trimethoxysilane as a compound (B). After carrying out addition mixing of the four copies, particulate concentration 10wt% of the MEK dispersing element (S-2) was obtained by carrying out 2 time processings by a sand mixer.

[0074]— To an example 1(3)-addition tub, the distillate line which has a cooler, and the application-of-pressure reaction vessel provided with the agitator, an In content ZnO ultrafine particle (In content: — In/Zn=9-mol% and crystallite diameter Dw= — 25 nm) Acetoxy group coupling amount: 3mol% / particles Propylene glycol monomethyl ether. Stirring at 25 \*\*, after teaching 1000 copies of suspension objects distributed by 30wt% of concentration to (the following and PGM) and replacing gaseous phase atmosphere by nitrogen (stirring power requirement 0.05kw/m<sup>3</sup>). Addition mixing was carried out having covered 120 copies of PGM solutions which contain aluminum tree sec butoxide by 20wt% of concentration for 5 minutes from the addition tub as a compound (A).

[0075]After carrying out addition mixing, the suspension object (13a) was acquired by carrying out

heating temperature up and holding for 1 hour at the bottom product temperature of 170 \*\* (gaseous-phase-pressure power: 3kg/cm<sup>2</sup>). Next, as a compound (B), it applied to the suspension object (13a) held at 170 \*\* for 5 minutes, addition mixing was carried out, and 240 copies of PGM solutions which contain beta-(3, 4 epoxycyclohexyl) ethyltrimethoxysilane at 10wt% were held at 170 \*\* for 2 hours. Extracting \*\* of a gas phase portion slowly by opening the valve of a distillate line for the acquired suspension object (13b) gradually in the state of heating stirring. After distilling off a part of solvent component which was generated at the reaction on a compound (A), (B), and the surface of a particle and containing butanol, methanol, etc., particulate concentration 35wt% of the PGM dispersing element (S-3) was obtained by cooling to a room temperature.

[0076]— In the example 1(4)-example 1 (1) — an In content ZnO ultrafine particle (In content: — In/Zn= 5mol% and crystallite diameter Dw= — 11 nm) Acetoxy group coupling amount: It is made the same using 3mol% / particles except having changed the kind of a compound (A) and (B), and the mixing ratio. A suspension object (14a) and (14b) were prepared one by one, and the In content ZnO ultrafine particle by which the surface treatment was carried out obtained the toluene dispersing element (S-4) distributed at particulate concentration 30wt%.

— In the comparative example 1(1)-example 1 (4), particulate concentration 30wt% of the toluene dispersing element (Sc-1) was obtained like Example 1 (4) except not using a compound (A).

[0077]— In the comparative example 1(2)-example 1 (4), after preparing a suspension object (14a), particulate concentration 30wt% of the toluene dispersing element (Sc-2) was obtained by not using a compound (B) but carrying out heating concentration by an evaporator. Each above-mentioned example 1 (1) The evaluation result of the analysis result of the particles in a solvent dispersing element obtained by -1 (4), the comparative example 1 (1) - 1 (2) and the dispersion stability of each solvent dispersing element, and distributed particle diameter is shown in Table 1.

Example 2 Addition mixing of 77 copies of PGM dispersing elements (S-3) obtained in manufacture-example 2(1)-example 1 of the plasticizer dispersing element (3) was carried out at 100 copies of dioctyl phthalates which are a plasticizer, next, the thing for which it heats under decomposition, and evaporation distilling off is carried out and toluene is filtered using an evaporator — an ultrafine particle — 20wt% — the plasticizer dispersing element (P-1) to contain was obtained. The evaluation result of the distributed particle diameter of the particles in the obtained plasticizer dispersing element was O, and dispersion stability was O.

[0078]— making it be the same as that of Example 2 (1) except using the PGM dispersing element (Sc-1) obtained by the comparative example 1 (1) in the comparative example 2(1)-example 2 (1) — an ultrafine particle — 20wt% — the plasticizer dispersing element (Pc-1) to contain was obtained. The distributed particle diameter evaluation result of the particles in the obtained plasticizer dispersing element was x, and dispersion stability was \*\*.

Example 3 100 copies of toluene dispersing elements (S-4) obtained in coating composition-example 3(1)-example 1 (4), as a binder component — an acrylic polyol resin solution (solids concentration 50wt%). After carrying out addition mixing and carrying out distributed processing to 80 copies of 50% of hydroxyl value solid content, six copies of hardening agents (polyisocyanate: isocyanurate denaturation hexamethylene diisocyanate) were added, and the coating composition (C-1) was prepared.

[0079]— In Example 3 (2) — the (5)-example 3 (1), coating composition (C-2) — (C-5) was prepared like Example 3 (1) except changing a dispersing element, a linear component, the mixing ratio, etc., as shown in Table 2.

— In the comparative example 3(1)-example 3 (1), the coating composition (Cc-1) was obtained like Example 3 (1) except using the toluene dispersing element (Sc-1) which obtained the dispersing element by the comparative example 1 (1).

[0080]— In the comparative example 3(2)-example 3 (1), the coating composition (Cc-2) was obtained like Example 3 (1) except using the toluene dispersing element (Sc-2) which obtained the dispersing element by the comparative example 1 (2). The result of having compared the paint (C-1) obtained in Example 3 (1), the comparative example 3 (1), the paint (Cc-1) obtained by 3 (2), and the pot life of (Cc-2) is shown in Table 3.

Example 4 by applying to a 1.5-mm-thick glass plate the coating composition (C-1) obtained in coating article-example 4(1)-example 3 (1) by a bar coating machine, and carrying out hot air drying for 10 minutes at 100 \*\*, Particles obtained the coating article (F-1) in which the tunic (10

micrometers of thickness) by which distributed content was carried out was formed.

[0091]— In the comparative example 4 (1) and the (2)—example 4 (1), particles obtained similarly the coating article (Fe-1) and (Fe-2) in which the tunic by which distributed content was carried out was formed except using the comparative example 3 (1) and 3 (2). The result of having evaluated the weatherability of the coating article obtained, respectively by Example 4 (1) and the comparative example 4 (1) and (2) is shown in Table 5.

— In Example 4 (2) — the 4(5)-example 4 (1), various coating article (F-2) — (F-5) was obtained by applying each amount constituent of \*\* obtained by Example 3 (2) — (5) to the substrate shown in Table 4. An evaluation result is shown in Table 4.

[0082] Example 5 Melting kneading of the interlayer, 15 copies of plasticizer dispersing element [1] which were obtained in manufacture—example 5(1)—example 2 of the resin-molding article (1) [P-1], 25 copies of dioctyl phthalate, and polyvinyl-butylal resin 100 weight section was carried out, and particulate concentration 2.1wt% of the resin composition was obtained. Extrusion molding of this constituent was carried out, and the 0.8-mm-thick polyvinyl-butylal sheet was obtained.

Transparency Q, ultraviolet-rays cover nature, and the heat ray cover nature of the obtained sheet were Q.

— In the comparative example 5(1), the 0.8-mm-thick polyvinyl-butyl sheet was similarly obtained except using 15 copies of plasticizer dispersing elements (Pc-1) obtained by the comparative example 2(1). The transparency of the obtained sheet was x.

[0083]— The powder by which the surface treatment was carried out by removing a solvent by an evaporator (example 1 (1)). The dispersing element (S-3) obtained in example 5(2)—example 1 (3) was obtained, carrying out melting kneading of these two copies of powder, and 98 copies of

obtained by carrying out disintegration using an evaporator from the toluene dispersing element (So-2) obtained by the comparative example 5(2)—comparative example 1 (2) --- particles --- 2wt% --- the 0.5-mm-thick polycarbonate resin sheet to contain was obtained. The obtained sheet was a sheet which became turbid and transparency was x.

[0094] The polyvinyl-butyl sheet obtained in manufacture-example 6(1)-example 5 of the example 6 glass laminate (1), it inserted into 3-mm-thick clear glass, and the bottom of decomposition, and after holding at 100 °\* for 1 hour, the temperature was lowered in ordinary temperature, it put in the autoclave apparatus, and lamination glass (G-) was obtained by processing for 30 minutes under application of pressure and heating (pressure of 10 kg/cm<sup>2</sup> (130 °\*)). The obtained lamination glass (G-) shows the transparency not more than Hayes 2% (transparency O), and is excellent in the cover nature of ultraviolet rays and a heat ray (each cover nature Q).

[0085]

[Table 1]

[illegible]

[0086]  
[Table 2]

[Translation done.]

実施例 No.	塗料 組成物 No.	組成物原料		硬化剤	固形分 /塗料 (wt %)	塗粒子 /固形分 (wt %)
		溶媒 分散体	バインダー樹脂			
3 (1)	C-1	S-4	79%BA 10-1樹脂	8%VFA10-1	43	40
3 (2)	C-2	S-4	79%BA10-1	8%VFA10-1	40	40
3 (3)	C-3	S-3	ポリエスチレン樹脂	—	20	30
3 (4)	C-4	S-2	79%BA10-1樹脂	—	40	40
3 (5)	C-5	S-1	アクリル樹脂	—	28	30
比較 (1)	Cc-1	Sc-1	79%BA 10-1樹脂	8%VFA10-1	43	40
比較 (2)	Cc-2	Sc-2	79%BA10-1	8%VFA10-1	43	40

[0087]

[Table 3]

実施例 No.	塗料粘度 (cP/20℃)		ゲル化時間 (hr)	ポットライフ 評価結果
	硬化剤 添加直後	添加 3時間後		
実施 (1)	15	35	8	○
比較 (1)	12	45	3	×
比較 (2)	40	73	5	△

[0088]

[Table 4]

実施例 No.	塗工品 No.	塗料 組成物	基材	乾燥条件	乾燥膜厚 ( $\mu$ m)	塗工品の特徴		
						透明性	塗膜 密着性	紫外線 耐候性
4 (1)	F-1	C-1	ガラス板	100℃10分	12	○	○	○
4 (2)	F-2	C-2	79%BA	100℃10分	8	○	○	○
4 (3)	F-3	C-3	PET444	100℃10分	10	○	○	○
4 (4)	F-4	C-4	8%BA10-1板	常温2日及び 100℃2hr	8	○	○	×
4 (5)	F-5	C-5	79%BA10-1板	90℃5分	5	○	○	×

[0089]

[Table 5]

実施例 No.	塗工品 No.	耐候性
4 (1)	F-1	A
比較 (1)	Fc-1	C
比較 (2)	Fc-2	B

[0090]

[Effect of the Invention]Temporal gelling cannot get up easily and the inorganic system particles concerning this invention are excellent in dispersion stability. Temporal gelling cannot get up easily and, moreover, the inorganic system particle containing composition concerning this invention makes the product which is excellent in dispersion stability and weatherability obtained. Since the mold goods concerning this invention contain inorganic system particles, they are excellent in weatherability and transparency and its visible light transmittance state are high. Since the paint article concerning this invention is provided with the coat containing inorganic system particles, it is excellent in weatherability and transparency and its visible light transmittance state are high.

[0091]The surface modification method concerning this invention should be [ that gelling cannot get up easily temporarily ] excellent in dispersion stability in inorganic system particles.